

# Lecture 32

P, NP

# **Two Sides of Computation**

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**Possibility**

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**Impossibility**

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**Possibility: Algorithms**

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**Impossibility: Complexity Theory**

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Deals with creating efficient algorithms for computational problems.

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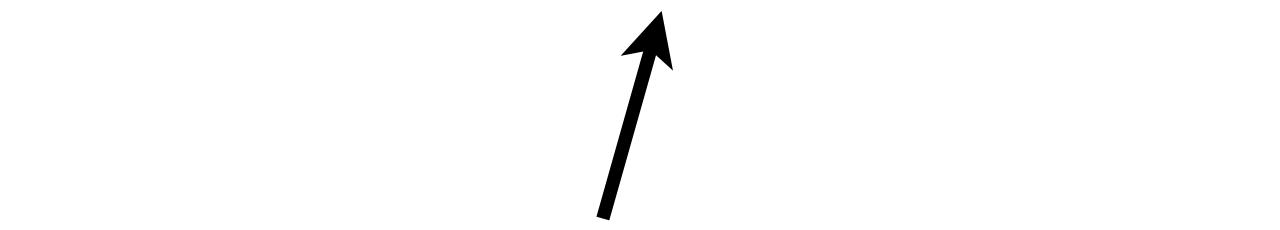
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Mostly decision problems.

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**Note:** We will assume that in the problems an **input** is always provided in **encoded binary form**.

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Decision problems can be expressed as sets.

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Binary encoding of  $x, y$ , and  $i$ .

The polytime algorithm you have in your mind  
is actually an exponential time algorithm.

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**Note:** NP stands for **nondeterministic polynomial time**.